COLORADO DEPARTMENT OF HEALTH
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION

SUBJECT: COMMENTS, 1989 AND 1990 ANNUAL GROUND WATER MONITORING REPORTS FOR REGULATED UNITS AT THE ROCKY FLATS PLANT AND 1990 GROUND WATER ASSESSMENT PLAN ADDENDUM

This is a compilation of comments for the 1990 Ground Water Assessment Plan Addendum and the 1989 and 1990 reports on ground water monitoring at the Rocky Flats Plant. The comments are sent as a single document because the general problems found in these submittals are similar.

The reports and plans covered in this review show improvement from those submitted in March and September of 1989, but there is still little or no emphasis on evaluating historic and current data relationships that may show contamination trends at the regulated units. 6 CCR 1007-3, Part 265.93, infers the annual submittal should include this type of analysis to determine the rate of migration of the contaminant plume and any changes in the actual extent of contamination in the area.

Ground water from north and northwest sections of the Solar Evaporation Ponds shows an increased amount of contamination through the two years covered in these reports. The contaminant plume has not been adequately identified in these areas. More characterization needs to be done in the northwest quadrant of the unit. The monitoring system in the southern area of the site should also be refined to better show the rate of migration and extent of any contamination present.

COMMENTS
GROUND WATER ASSESSMENT PLAN ADDENDUM FOR ROCKY FLATS PLANT

COMMENT 1: SECTION 2.1.2, HYDROGEOLOGY (West Spray Field)

This section states "although the bedrock sandstones may be hydraulically connected to the alluvium, there does not appear to be any contamination of the ground water within the sandstones." Since only one well is located in the regulated area's designated boundary, there are not enough data points to correlate this. Further characterization of the area should be completed before this judgement is made.

COMMENT 2: SECTION 2.1.4, POTENTIAL PATHWAYS AND TRANSPORT MECHANISMS (West Spray Field)

This section states "Current data indicates that the [bedrock] sandstone is not significantly more permeable than the bedrock claystone" and refers to Section 2.1.2 for correlation. Section 2.1.2 does not provide any permeability data but states "there does not appear to be any contamination of the ground water within the sandstones." The permeability of the bedrock sandstone needs to be provided to support these statements.

COMMENT 3: SECTION 2.2.2, FIELD MEASUREMENTS (West Spray Field)

This section states water levels are measured in each monitoring well monthly and at the time of sampling; however, data from past events suggests the water level measurements are done on a quarterly basis. What frequency is actually followed at the plant for these measurements?

This section also states "significant variations between field pH and laboratory pH can indicate that reactions may be occurring in the sample prior to analysis." Does this refer to the samples obtained from the well which are acidified or to the field measurements of the well water? If this statement refers to the first concern, current guidance and plant sampling SOPs require the well water samples to be acidified to a pH less than 2. The precipitation seen in these samples may be caused by not having enough acid in the sample. To make sure the sample is properly acidified, it should be tested with pH paper. Sample holding times should also be carefully reviewed to make sure they are not exceeded. If the second concern is being looked at, the authors should remember there probably will be a difference between readings taken in the field and in the laboratory, as pH can vary with temperature.

COMMENT 4: SECTION 2.3.1, MONITORING WELLS (West Spray Field)

This section proposes construction of five monitoring wells completed in the alluvium with screened zones from ten feet below to five feet above the water table. Although it is useful to construct alluvial wells in this way to determine if any contamination is present, a series of nested wells in the alluvium at predetermined depths should be used to determine both the horizontal and vertical extent of any contaminants. This would help provide a better idea of the uppermost aquifer's structure, as well as giving a better understanding of contaminant transport in the aquifer.

COMMENT 5: SECTION 2.3.2, FIELD MEASUREMENTS (West Spray Field)

This section states "ground water levels will be measured at all monitoring wells during the first week of each quarter" at the West Spray Field. However, in Section 2.2.2 of this document, Section 3.1 of the 1989 Annual Ground Water Monitoring Report (page 3-2), and in previous documents, it is stated ground water levels are measured on a monthly basis. No monthly data has been presented in any of these reports for the RCRA monitoring wells. What is the current water level measurement policy for monitoring wells at the plant? Is there a reason for the discrepancy in the listed documents?

COMMENT 6: SECTION 3.1.4, POTENTIAL PATHWAYS AND TRANSPORT MECHANISMS (Solar Evaporation Ponds)

This section states volatile organic contamination is limited to the area south of Pond 207-C, but, according to data from the 1989 Annual Ground Water Monitoring Report for Regulated Units at the Rocky Flats Plant, volatile organic contamination was also found in wells north and east of this pond.

The section states "migration [of ground water] to the east appears to be limited to approximately 600 feet east of the ponds by unsaturated conditions in the alluvium." Since the french drain for the solid waste management unit is located here, the ground water level may be artificially depressed or diverted by the drainage system or other man-made features in the area. Further evaluation and characterization of the area to confirm these limits should be done.

COMMENT 7: SECTION 3.2.2, FIELD MEASUREMENTS (Solar Evaporation Ponds)

This section states ground water levels are measured monthly in each of the wells and continues, "Monthly water level measurements are used to evaluate seasonal changes in ground water flow direction and gradient." If monthly ground water levels are taken to evaluate the seasonal changes in the potentiometric surface, why are none of these values presented as monthly potentiometric maps in the annual reports?

COMMENT 8: SECTION 3.3, PROPOSED MODIFICATIONS (Solar Evaporation Ponds)

Potentiometric surface control points (e.g., wells and piezometers) in the north, south, and southwest parts of the area appear to have minimal coverage and may not accurately represent the ground water surface. This appears to be true in areas where mostly bedrock wells have been constructed. Further characterization of the vadose zone through soil borings, as outlined in the plan, will provide more information for the area, but these borings may be more valuable if other test methods, including alluvial and bedrock wells, are added to the site characterization plan.

Special consideration should be given to the north and northwest sides of the area during characterization of the site because of the plumes of organics detected during recent sampling events at wells P210189 and 22-86. Characterization of the ground water flow in this area will have a definite bearing on the fate and transport of some of these materials.

COMMENT 9: SECTION 3.3.1, MONITORING WELLS -- VADOSE ZONE CHARACTERIZATION (Solar Evaporation Ponds)

What approximate depths will be used for the 27 vadose zone borings proposed at the Solar Evaporation Ponds?

COMMENT 10: SECTION 4.1.4, POTENTIAL PATHWAYS AND TRANSPORT MECHANISMS (Present Landfill)

In this section, the water level data for areas downgradient of the Present Landfill are sparse. This may be due to the Present Landfill pond dam, which may depress the potentiometric surface near the current wells, or possible preferential flow through the sandstone lenses in the bedrock that are not currently monitored. Deeper wells and geophysical studies of the area will help provide more information on the potentiometric surface in the area.

This section states there are cyclic variations in the potentiometric surface at the Present Landfill. Is it a yearly, quarterly, or monthly variation?

This section states the water level in well 64-87 has "undergone a number of significant fluctuations" and that this may be due either to intermittent functioning of the ground water diversion and leachate collection system, or to precipitation. The section also states this fluctuation has not yet been evaluated. Since the leachate collection system has been buried by landfill wastes, it is important to determine if the system is actually working. Assessment plans for the Present Landfill should include an evaluation of the water levels in 64-87, precipitation at the plant, and water removed from the leachate collection system.

COMMENT 11: SECTION 4.2.2, FIELD MEASUREMENTS (Present Landfill)

See comments for Sections 2.3.2 and 3.2.2 on monthly well water level monitoring and pH problems.

COMMENT 12: SECTION 4.2.3, MONITORING WELLS (Present Landfill)

Since contaminated ground water may leak downward into bedrock units, as noted in Section 4.1.4, bedrock monitoring wells should be planned using study results such as the 1989 Ground Penetrating Radar Survey. The south slurry trench area should also be considered for bedrock well construction because of the sandstone in the area. Since the sandstone's extent and permeability has not been characterized completely, work needs to be done to determine if it is a preferential path for ground water and contaminant flow.

This section states wells with a saturated thickness of more than 13 to 15 feet will have the lower five feet of the well screened and the upper portion of the well from five feet below the water level to within three feet of the ground surface screened. How will ground water from each screened section be sampled to determine if contaminants have migrated vertically? From the description given in the report it appears the water in these two zones could commingle and give a sample result that could be too low or too high for the actual values of the screened areas. Nested wells screened at different intervals should be used to get more accurate information.

COMMENT 13: SECTION 4.2.3, MONITORING WELLS -- PIEZOMETERS (Present Landfill)

Although the construction sheets show the bottom of the ground water diversion and leachate collection system is built above the bedrock surface, this may not be true. If soil and bedrock data is available from the as-built drawings, this should be looked into. If the drawings do not show this, further study, possibly including geophysical methods, may have to be used to confirm this.

The section states the piezometers to be constructed in the Present Landfill will have their water levels measured on a monthly basis. Will this be done along with other monthly measurements described earlier? If not, how long will this measurement program last, and will it become part of the water level measurement program now in effect?

COMMENT 14: SECTION 4.2.4, FIELD MEASUREMENTS (Present Landfill)

It is stated here ground water levels "will be measured at all monitoring wells during the first week of each quarter." Is this a different guidance from the requirements described previously in this document and in others? What is the frequency for measuring ground water levels?

COMMENT 15: SECTION 6.2, DATA REPORTING

6 CCR 1007-3, Part 265.94, requires owner/operators to make quarterly evaluations on their ground water monitoring program, as well as the annual report required in Part 265.93. DOE/EG&G should begin doing this as soon as possible, as it is an inspectible requirement.

Annual reports submitted to CDH should include comparisons of data from previous years to current data. These trend analyses will help determine the rate and extent of contamination present as required under 6 CCR 1007-3, Part 265.93, as well as assist the plant and regulatory agencies in determining the appropriate monitoring level for each regulated unit.

COMMENT 16: SECTION 6.3, DATA VALIDATION

If the data validation process takes only two to four weeks to complete, why are large data gaps found in recent reports submitted to CDH? Is the two- to four-week time an optimum number, or is it an actual result? If the time lag is that short, there should be little reason to produce reports in the future which have large data gaps that require addenda, as in the 1989 and 1990 ground water monitoring reports.

COMMENT 17: SECTION 7.1, BACKGROUND WATER QUALITY PROGRAM

Since the current background geochemical characterization program at the plant uses a site-wide approach, will the values from these studies be compared to the "ambient background" values in the upgradient wells at each of the RCRA-regulated units? While tolerance intervals from the natural background well studies may aid in determining what contamination is at a given site, it is possible that, by comparing these values, local variations in ground water flow and any changes in contamination could be quickly found and evaluated.

COMMENT 18: SECTION 7.2, PROCEDURES FOR STATISTICAL DETERMINATION OF CONTAMINATION

See comments from Section 7.1 on developing tolerance intervals from "ambient" and "natural" background data.

In the "intrawell comparisons" section, the plan implies comparisons will be made between old and new data. When will these comparisons be made and presented in report format, and how often will they be repeated?

COMMENT 19: SECTION 8.0, GROUND WATER MONITORING SCHEDULE

This section should include the criteria used to determine which wells will be added or removed from the sampling schedule. Revised sampling schedules for these wells should be provided to CDH as soon as the changes are made and approved.

COMMENTS
1989 ANNUAL GROUND WATER MONITORING REPORT
FOR REGULATED UNITS AT ROCKY FLATS PLANT

COMMENT 1: SECTION 1.2, PURPOSE AND SCOPE

The report notes volatile organic data have been validated for the fourth quarter of 1988 and the first and second quarters of 1989. Since there are 90 days between the final sampling date of the fourth quarter of 1989 and the due date of the reports, there should be enough time to ensure at least three quarters of the VOC data are validated and presented in this report. Average turnaround times for validated data need to be reviewed, and, if necessary, changes made either in validation procedures or labs performing the analyses to make sure data is returned quickly to allow analysis and reporting.

In the 1989 report, missing VOC data for the 3rd quarter of 1989 range from 34 percent of total data for the West Spray Field to 60 percent of total data at the Present Landfill. U.S. EPA guidance for contamination analysis (SW-846) requires that volatile organic samples should be analyzed within seven days after sampling. The third quarter data should be available in this report. If there are reasons why these data are not available, they should be listed in the report. Expected arrival dates for these data should also be included, and the information presented to the State as an update as soon as the plant is able to do so.

COMMENT 2: SECTION 1.3.1, INTERPRETATION OF THE UPPERMOST AQUIFER

The definition of aquifer in 6 CCR 1007-3, Part 260.10, "a significant source of ground water," is not further interpreted by 40 CFR, Part 191 (Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-level and Transuranic Radioactive Wastes). 6 CCR 1007-3, Part 260.10 does not provide a numeric value for the rate or amount of flow needed in an aquifer to define it as such. Amounts of total dissolved solids present in the water, as well as the depth of the aquifer, are also not factors in the definition given in Part 260.10. The primary use of the aquifer is also not a consideration under Part 260.10.

Although the uppermost aquifers identified for the regulated units at Rocky Flats Plant are not currently used as domestic or agricultural water sources, some of these units may be hydraulically connected to other units in the area which are tapped for these uses. If hazardous constituents are present in the uppermost aquifer, there is a possibility of contaminating the domestic and agricultural sources. This possibility should be kept in mind when an aquifer is evaluated for contamination.

1.3.2

COMMENT 3: SECTION 1.3.1, GROUND WATER QUALITY ASSESSMENT

The report states variations in water chemistry have not been evaluated "because at least two years of quarterly data are needed." A preliminary analysis can be made with available data and then updated as other data is received. Older data sets can be used initially; as more current and validated data become available, a more accurate trend analysis can be made.

Background tolerance values referenced in this section are for the entire plant. The background values used should be unit-specific; that is, the downgradient values at each unit should be compared only with those for upgradient wells for that unit. If, as in the case of the Solar Evaporation Ponds, the downgradient values are smaller than those in the upgradient wells, several scenarios, including the possibility the background wells are actually downgradient of the regulated unit, should be considered.

COMMENT 4: SECTION 2.1, SUMMARY OF PREVIOUS INVESTIGATIONS (Solar Evaporation Ponds)

Why were monthly water level measurements not taken at the 1989 monitoring wells as specified in the report? Although samples taken were considered as fourth quarter data, the water level measurements would have been useful in examining potentiometric data for the areas.

Since monthly well water measurements are specified to be taken at all of the wells in the area, why is potentiometric data given only for each quarter? Monthly data plotting would give an accurate picture of the actual flow patterns in the area and help clarify some questionable areas of flow.

COMMENT 5: SECTION 2.1.1, NATURE AND EXTENT OF GROUND WATER CONTAMINATION (Solar Evaporation Ponds)

The report states the extent of the sandstone hydraulically connected to the bedrock flow under the Solar Evaporation Ponds was not fully characterized in 1988, but additional bedrock and alluvial wells were installed in 1989 to better characterize this. What was found as a result? Were any further characterizations done, and what results were obtained for this year?

COMMENT 6: SECTION 2.2, UPPERMOST AQUIFER (Solar Evaporation Ponds)

There is some confusion in this section over the sandstone lenses of the Arapahoe formation. Earlier, in section 2.1.1, the report states the full extent of the Arapahoe formation sandstones are not known; yet, here it states that the Arapahoe formation sandstones are not a part of the uppermost aquifer. Can this be proven correct, given the lack of characterization? Have all areas, including potential hydraulic connections through structural, as well as stratigraphic means, been considered?

COMMENT 7: SECTION 2.3, GROUND WATER FLOW DIRECTIONS (Solar Evaporation Ponds)

Although the report assumes ground water under the Solar Evaporation Ponds flows eastward in the Arapahoe formation, this does not appear consistent with potentiometric data presented here which shows a local northerly component of flow.

In Table 2.3, what time of year were the Packer, drawdown and recovery, and slug tests done on the wells listed here? With the known seasonal variability of the uppermost aquifer's potentiometric surface, dynamic flow in the area could affect the measured recharge in each of the wells. Rather than giving a single value for each area in this table, a range of hydraulic conductivities should be presented.

COMMENT 8: SECTION 2.4.1.1, UPGRADIENT GROUND WATER QUALITY (Solar Evaporation Ponds)

Nitrates were found above background levels in alluvial wells 22-86 and 56-87, and bedrock wells P209189, P209389, and P210189. These levels may indicate leakage from the ponds, mounding, and/or preferential paths in the area. Further investigations in the area should consider these possibilities.

The summary for this section states "the upgradient wells do not appear to be impacted by the solar ponds." With the high nitrate values and other contaminants found in the designated upgradient alluvial and bedrock wells, this does not follow. Empirical data presented in this report indicates that these upgradient wells may actually be downgradient of the area and that a preferential path may exist on the north and west sides of the pond area. Further investigation of the area needs to be done before the Original Waste Process Lines can be named as the sole source of contamination in the area.

COMMENT 9: SECTION 2.4.1.6, GROUND WATER QUALITY EAST OF THE SOLAR EVAPORATION PONDS

Why are there no first or third quarter 1989 data provided for these wells? This report seems to indicate these wells were not sampled during these quarters. Some explanation of why this data was not provided should be given here.

COMMENT 10: SECTION 2.4.1.6, GROUND WATER QUALITY IN SOUTH WALNUT CREEK DRAINAGE

The ground water quality in this area may be heavily influenced by contaminants originating at the 903 Pad, Mound, and East Trenches, and thus may not accurately represent contamination coming from the Solar Evaporation Ponds area.

COMMENT 11: SECTION 2.6, CONCLUSIONS (Solar Evaporation Ponds)

The plant needs to consider the possibility there has been leakage from the Solar Evaporation Ponds to designated upgradient wells located to the north and southwest of the area. Seeps found along the hillside may also indicate preferential flow paths in the underlying Arapahoe Formation and alluvium. Further detailed research should be done to characterize the ground water flow in this area, including the french drain system.

COMMENT 12: SECTION 3.1.1, NATURE AND EXTENT OF GROUND WATER CONTAMINATION (West Spray Field)

Since there is only one bedrock well in the vicinity of the West Spray Field that can be considered to be downgradient of the area, how can the blanket statement "bedrock ground water at the West Spray Field does not appear to impacted by waste management activities" be made?

COMMENT 13: SECTION 3.2, UPPER MOST AQUIFER (West Spray Field)

The Upper Laramie and Arapahoe formations have not proven to not have hydraulic connections with the Rocky Flats alluvium. The facility cannot assume they are not part of the uppermost aquifer until this is shown.

COMMENT 14: SECTION 3.4.7, BEDROCK GROUND WATER QUALITY (West Spray Field)

Only wells 48-86 and 8-81 may be good downgradient indicators of ground water quality in this area. The other wells listed here are either upgradient of the area (well 49-86), or are located in places not impacted by the West Spray Field (well 52-86). Since wells 48-86 and 8-81 have shown values which are above background levels for inorganic constituents, further characterization of the bedrock should be done.

COMMENT 15: SECTION 3.6, CONCLUSIONS (West Spray Field)

The conclusion that nitrate contamination is only locally elevated at the West Spray Field should not be made until bedrock in the area is proven to not be contaminated. The bedrock ground water quality should be further characterized to make certain this is true.

COMMENT 16: SECTION 4.0, GROUND WATER MONITORING AT THE PRESENT LANDFILL

What is the current extent of the Present Landfill area? Will the area be mapped and/or surveyed to determine how much of the leachate collection system has been buried through current and previous operations?

COMMENT 17: SECTION 4.1.1, NATURE AND EXTENT OF GROUND WATER CONTAMINATION (Present Landfill)

It was previously reported (1988 Annual Monitoring Ground Water Monitoring Report, 1989 Ground Water Assessment Plan) that a tritium source had been detected in the landfill and that tritium occurred in the ground water at levels above background. What further investigation has been done to locate this source, and what other radiochemical analyses are being done at the area? What impacts have any positive results had on monitoring and assessment in the area?

COMMENT 18: SECTION 4.2, UPPERMOST AQUIFER (Present Landfill)

Have the unweathered claystones present just below the uppermost aquifer been examined both in the field and through other means to ensure that there is no structural enhancement of their normally low conductivity (e.g., fracturing)?

COMMENT 19: SECTION 4.3, GROUND WATER FLOW DIRECTIONS (Present Landfill)

The dam for the Present Landfill pond, shown in Figure 4.1, may be causing or have caused a depression in the potentiometric surface east of the Present Landfill pond. The dry wells located east of the unit may not be deep enough to adequately monitor ground water flow during drier seasons.

COMMENT 20: SECTION 4.4.3.2, WEATHERED SANDSTONE GROUND WATER QUALITY (Present Landfill)

The dry alluvium found around well B207089 may be so because the potentiometric surface is depressed by the Present Landfill dam. Deeper wells may need to be constructed in the area to give additional information about the hydrology in the area.

COMMENTS
1990 ANNUAL GROUND WATER MONITORING REPORT
FOR REGULATED UNITS AT ROCKY FLATS PLANT

COMMENT 1: Section 1.2, Purpose and Scope

The report notes here that the data sets are incomplete for the 1990 reporting year. The plant has had a continuous history of poor turnaround times with its sample data, which often impacts the quality of report the plant is able to produce. This situation needs to be corrected soon as possible.

COMMENT 2: Section 1.3.1, Interpretation of the Uppermost Aquifer

The term aquifer, as defined under the Colorado Hazardous Waste Regulations (6 CCR 1007-3, section 260.10), is "a geologic formation, group of formations, or part of a formation capable of yielding a significant amount of ground water to wells or springs." "Significant," in this case, is not further defined through 40 CFR Subpart B 191.12(i). Since ground water is present and readily sampled in the majority of the numerous monitoring wells present at the facility, the uppermost aquifer meets the regulatory definition.

The Rocky Flats Plant ground water monitoring program is currently regulated under the Colorado Hazardous Waste Regulations that apply to RCRA interim status units (6 CCR 1007-3, Subpart F, sections 265.90 through 265.94). Until permits for operation, closure, and remediation of the regulated areas are issued to the facility, these regulations still apply.

COMMENT 3: Section 2.3, Conceptual Model of the Ground Water Flow System [Solar Evaporation Ponds]

This section states that flow in the general vicinity of the Solar Evaporation Ponds is easterly. This is not always so, according to well data presented in this report. A northerly component of flow is present in the northwest portion of the site, according to potentiometric data from wells P209289 and 22-86. The variation in potentiometric data may indicate the french drain installed on the north and northeast sides of the unit does not catch all water that is found in the unconfined aquifer. A water balance needs to be performed on this area to determine the amount of water which is potentially affected by the unit. Additional wells may also aid in determining if this data represents the potentiometric flow in the area.

COMMENT 4: Section 2.4.1.2, Ground Water Quality Within and Adjacent to the Solar Evaporation Ponds

The values for the volatile organic compounds found in wells 22-86 and 56-87 are of concern because of their location (currently considered to be upgradient) and the lack of additional surficial wells there which could better determine the rate and extent of volatile organic compound contamination in the area. The 1989 Ground Water Assessment Plan and 1990 Addendum call for wells to be spaced 300 feet on center in areas where contamination has been found in order to determine the size and extent of the contamination plume. Currently there are only five surficial wells located in the northwest quadrant of the regulated units. These wells range from 300 to more than 600 feet on center apart from the nearest well and appear to be randomly distributed; current well coverage in this area is insufficient. The facility needs to determine how it will handle further investigation of this area, including further well construction, in order to determine the rate and extent of contamination already detected in the above wells.

Elevated levels of volatile organic compounds found in well 35-86 may be due to contamination from the 903 Pad area and may not be part of the contaminant plume from the Solar Evaporation Ponds area. Further investigation should be made to ensure the well is not in the drainage pattern from the 903 Pad area.

COMMENT 5: Section 2.4.2.1, Upgradient Ground Water Quality

Well P209389 is actually downgradient of wells P209189 and P210189, according to potentiometric level measurements presented in this report. Well analysis data for well P209389 show similar contamination to that found in well P210189. It is possible P209389's water quality is affected by a source near P210189, such as contamination left from the closure of the original Solar Evaporation Ponds. Further characterization of the ground water flow should be made here to determine the actual path of the ground water and contaminants detected here.

COMMENT 6: Section 2.4.2.3, Ground Water Quality Downgradient of the Solar Evaporation Ponds

With the extremely high values of carbon tetrachloride (CCl4) and other volatile organic compounds identified in upgradient weathered bedrock wells, it may be prudent to determine if adding weathered bedrock wells in the southeast quadrant of the Solar Evaporation Ponds area would be useful for plume delineation. These wells would be best emplaced as either paired wells with existing surficial wells or as surficial and bedrock well pairs.

COMMENT 7: Section 2.5, Contaminant Migration Rates

Ground water flow velocity in the northwest quadrant of the Solar Evaporation Ponds area may be much greater than the average rate of 1.2 x 10E-6 listed in this report. Previous evaluations of the area theorize that a paleochannel of sand exists in the uppermost aquifer in this area and is causing preferential flow through the site. This needs to be investigated more thoroughly to determine if there is actually a preferential flow path through the area that will affect ground water flow.

COMMENT 8: Section 2.6, Conclusions

The volatile organic compound detection may be due to the Original Solar Evaporation Ponds, rather than a source upgradient of the site such as the Original Waste Process Lines. Investigations in the southern half of the Solar Evaporation Ponds area will assist in determining whether or not other sources are affecting the unit.

The localized northerly flow component in the northwestern quadrant of the unit should be investigated to determine if this is having any effect on the ground water quality in the South Walnut Creek drainage below the ponds.

COMMENT 9: Section 3.1.1, Alternate Ground Water Monitoring Program

Which unit was well 56-86 completed in?

COMMENT 10: Section 3.1.2, Previous Nature and Extent of Ground Water Contamination

In this section, the report notes that methylene chloride was frequently found in the blank samples from the West Spray Field. Was this contamination problem common in most volatile organic compound blanks taken at the site? If so, the facility should recheck the lab analyzing the samples and determine if the data is useable.

Chromium is mentioned in this section as a possible hazardous waste constituent at the site. What type of chromium (e.g., hexavalent versus total) was measured?

COMMENT 11: Section 3.2, Uppermost Aquifer [West Spray Field]

Has it been conclusively determined that a) the Rocky Flats Alluvium in the West Spray Field area is fairly uniform (e.g., no preferential flow paths such as paleochannels), b) the vertical component of ground water flow is minimal compared to the horizontal component of flow, and c) there are no hydraulic connections to more porous units, such as the Laramie and Arapahoe formations? Even though the application of hazardous wastes was surficial, there is a possibility contamination may have reached these lower areas.

COMMENT 12: Section 4.3, Conceptual Model of the Ground Water Flow System [Present Landfill]

In the conceptual model, no consideration is given to data which indicates mounding and crossgradient flow occur in the area. 1990 potentiometric data from wells 64-87, 65-87, 66-87, 72-87, B206389, and B206489 indicate a southerly flow component during various times of the year. This phenomenon should be evaluated and included in future conceptual models of the area.

COMMENT 13: Section 4.4.1.2, Ground Water Quality Within and Adjacent to the Present Landfill

The blank contamination problems here appear similar to those noted for the West Spray Field. As stated in Comment 10, this should be evaluated and, if necessary, action taken to minimize contamination.

The high mercury level found in well 06-86 (1.4 mg/l) is of concern and should be rechecked to ensure it is a confirmed value. If it is, further investigation should be done to find the source and determine if any contamination of the ground water and surface water has occurred.

COMMENT 14: Section 4.5, Contaminant Migration Rates

Spraying operations on the southern portion of the Present Landfill pond area may impact the ground water quantity and quality of the unnamed Walnut Creek tributary. A water balance should be done here to assess the spray field's impact on the surface and ground water.

The valley fill alluvium below the Present Landfill area should be evaluated to determine the ground water flow rate during the periods it is not dry. Since the valley fill alluvium is, for the most part, reworked Rocky Flats alluvium, it is possible the deposits have greater porosity and permeability than the source deposit. Greater permeability could allow rapid spread of contaminants from the Present Landfill area to surface water periodically found in the drainage.

The sporadic elevations of mercury and TCE in wells 05-86 and 06-86 should be closely monitored, especially during wet years. It is possible these contaminants affect ground water quality when the ground water is available in enough quantities to flush them out of the area and into the runoff system.

COMMENT 15: Table 2-1, Solar Evaporation Ponds Ground Water Monitoring Wells

What does the term "lowermost aquifer" used in this table mean?

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